

SUBCOURSE

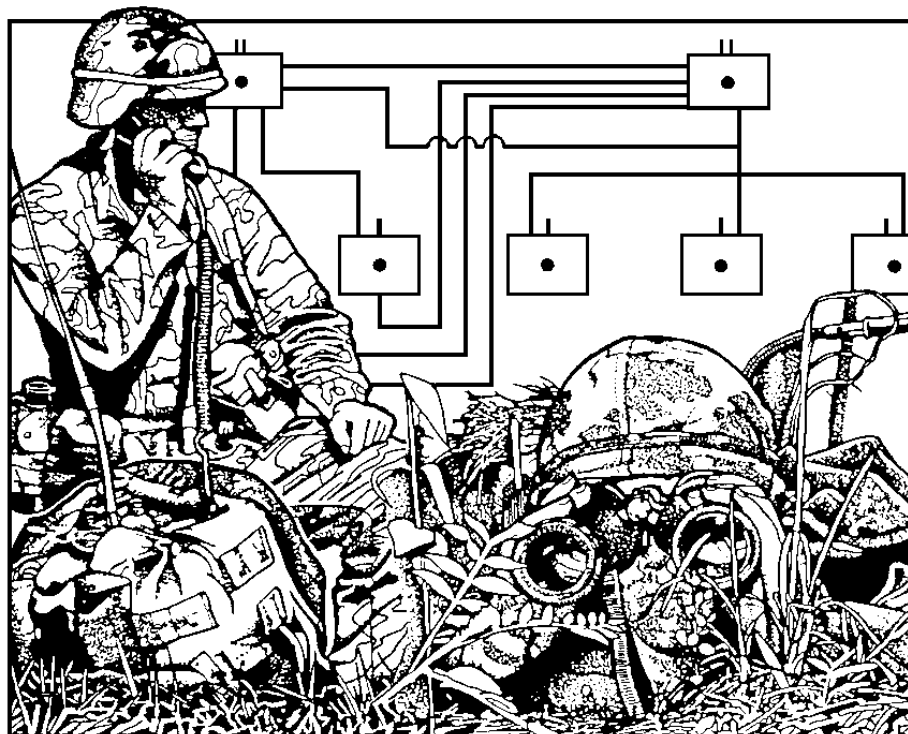
FA 8075

EDITION

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US ARMY FIELD ARTILLERY SCHOOL

**COMMUNICATIONS SYSTEMS OF A
DS/GS BATTALION (DIGITAL)**



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT

ARMY CORRESPONDENCE COURSE PROGRAM

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FIELD ARTILLERY OFFICERS MQS II SHARED TASKS

COMMUNICATIONS SYSTEMS OF A DS/GS BATTALION (DIGITAL)

SUBCOURSE FA8075

US Army Field Artillery School
Fort Sill, Oklahoma

Five Credit Hours

GENERAL

This subcourse is designed to train the skills necessary for performing tasks related to communication systems of a direct support (DS)/general support (GS) battalion (digital). This subcourse is presented in two lessons, each lesson corresponding to a terminal objective supporting the following military qualification skills (MQS) tasks:

LESSON 1: Identify Communications Systems of a Direct Support Battalion (Digital)

TASK NO: 01-2750.02-0001

TASK: Identify communications systems of a direct support battalion (digital).

CONDITIONS: You will be given the communications requirements for a direct support field artillery battalion.

STANDARDS: 1. Perform task in accordance with FM 6-20-1J and FM 6-50.
2. Correctly identify the internal and external communications systems (radio and wire) of a direct support battalion.

LESSON 2: Identify Communications Systems of a General Support Battalion (Digital)

TASK NO: 01-2750.03-0001

TASK: Identify communications systems of a general support battalion (digital).

CONDITIONS: You will be given the communications requirements for a general support field artillery battalion.

- STANDARDS:
1. Perform task in accordance with FM 6-20-1J and FM 6-50.
 2. Correctly identify the internal and external communications systems (radio and wire) of a general support battalion.

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ADMINISTRATIVE INSTRUCTIONS

Subcourse content. This subcourse contains two lessons. These lessons will enable you to identify the communications systems of a DS/GS battalion (digital). An introduction presents an overall view of the subject. Each lesson then explains how to perform each task.

Supplementary requirements. None.

Materials needed. None.

Supervisory assistance. There are no supervisory requirements for completion of this subcourse.

References. No supplementary references are needed for this subcourse.

GRADING AND CERTIFICATION INSTRUCTIONS

Instructions to the student. This subcourse has an examination that is a performance-based, multiple-choice test covering two lessons. You must score a minimum of 70 percent on this test to meet the objective of the subcourse.

Credit hours. Five credit hours will be awarded for successful completion of the subcourse.

*** * * IMPORTANT NOTICE * * ***

**THE PASSING SCORE FOR ALL ACCP MATERIAL IS NOW 70%
PLEASE DISREGARD ALL REFERENCES TO THE 75% REQUIREMENT.**

Lesson 1

IDENTIFY COMMUNICATIONS SYSTEMS OF A DIRECT SUPPORT BATTALION (DIGITAL)

OBJECTIVE

After completing this lesson, you will be able to identify the internal and external communications systems (radio and wire) of a DS battalion equipped with a tactical fire direction system (TACFIRE).

REFERENCES

This subcourse is based on FM 6-1, FM 6-20, FM 6-20-1J, FM 6-20-2J, FM 6-50, Close Support Study Group (CSSG) III: Final Report, and other materials approved for US Army field artillery instruction. However, development and progress render the text continually subject to change. Therefore, base your examination answers on material presented in this subcourse rather than on individual or unit experience.

1. INTRODUCTION.

a. Communications is the cornerstone for successful operations in TACFIRE-equipped units. For a DS field artillery (FA) unit to provide responsive fire support to a maneuver element on today's battlefield, it must have efficient and reliable communications systems. These systems must provide the commander with the means to control his unit, exercise tactical and technical fire direction, disseminate information and intelligence, and maintain contact with his higher headquarters and with reinforcing and supported units during both conventional and nuclear war.

b. During this lesson, we will discuss communications systems for divisional DS battalions in armored, infantry, and mechanized (AIM) divisions. The systems presented represent current thought at the US Army Field Artillery School as to the minimum essential communications required by divisional DS battalions. Changes to these systems are to be expected in the field to meet mission requirements.

2. **COMMUNICATIONS SYSTEMS.** A communications system is the result of a communications plan designed to fulfill the requirements of a specific mission. This plan is based on the following:

- Assigned mission.
- Tables of organization and equipment (TOE) which provide the communications assets.
- Communications responsibilities.

a. Communications systems must be as simple as possible and must be carefully planned. To ensure efficient and swift operation in combat, a unit must use its communications systems during its various training phases. When

properly planned, a prearranged communications system eliminates the need for publication of numerous and detailed signal orders and instructions and increases the efficiency of the system.

b. For artillery units, standard systems are used for each of the four standard tactical missions. Because of net standardization, rapid and accurate interface between units is possible in a combat environment. These standard net structures and designations should not be arbitrarily changed. Only when a nonstandard mission is assigned to a unit does the possibility arise for changing the net structures to meet new communications requirements. Such changes should be kept to a minimum to meet the requirements of the situation.

c. These standard net structures and designations should become part of the standing operating procedures (SOPs) of a unit for each mission that may be assigned to the unit. Normally, system diagrams will show this information in the clearest manner. As TOEs change, the addition and/or deletion of personnel and equipment will cause concurrent changes in these system diagrams. SOP diagrams must be kept current at all times. These system diagrams should reflect those communications nets needed to satisfy both internal and external communications requirements. For purposes of clarity, separate diagrams should be developed for the wire and radio systems.

3. COMMUNICATIONS REQUIREMENTS. The communications system of an artillery unit must satisfy two communications requirements--internal and external. These serve the unit for fire support coordination, tactical and administrative orders, and dissemination of information and intelligence.

a. Internal communications requirements. Internal communications requirements include the facilities for control and coordination of the activities of the unit. The installation and maintenance of the internal communications system is the responsibility of the unit commander. In a higher headquarters, such as a battalion or a division, the internal communications system serves as a part of the external communications system of the subordinate units. For example, the division artillery command net is a part of the division artillery internal communications system. However, it also serves as a part of the external communications system of the battalions which are organic or attached to the division artillery.

b. External communications requirements. External communications requirements include the facilities by which a unit maintains communication with its next higher headquarters, adjacent units (as required), and supported or reinforcing units for the purpose of receiving data and other information needed for the unit to meet its mission. The commander of any unit is responsible for the installation of his communications system and for its effective integration into the communications system of the next higher headquarters.

4. COMMUNICATIONS RESPONSIBILITIES. There are standard responsibilities that are followed when establishing communication between units.

a. Commander. The commander is responsible for the adequacy and proper use of the communications assets within his command and for their efficient operation in the systems of his next higher headquarters. The authority to establish, maintain, control, and coordinate the various communications assets

within a command may be exercised by a subordinate in the name of the commander. However, the responsibilities of the commander cannot be delegated.

b. Senior to subordinate. The senior unit commander is responsible for the establishment of communications with his subordinate unit commanders, whether organic or attached. This responsibility is mainly one of planning and directing the establishment of the linking communications, since assets belonging to either the senior headquarters or the subordinate unit may be used.

c. Standard tactical missions. Each of the four standard tactical missions that may be assigned to an FA battalion has nine inherent responsibilities, one of which is the responsibility for establishing communications.

- Direct support mission. An artillery unit with the mission of direct support has the responsibility to establish communications with the supported maneuver unit.
- General support mission. An artillery unit with the mission of general support (GS) does not have an inherent requirement to establish external communications with any other unit.
- General support reinforcing mission. An artillery unit with the mission of general support reinforcing (GSR) must establish communications with the reinforced artillery unit.
- Reinforcing mission. An artillery unit with the mission of reinforcing (R) is responsible for establishing communications with the reinforced artillery unit.

d. Joint maintenance. Regardless of who is responsible for establishing a communications system, all units or users being served by a system must help restore it once it is disrupted. This will expedite reestablishment of the disrupted system.

5. MEANS OF COMMUNICATION. The reliability of a communications system is greatly increased by the use of all means available. The various means of communication have different capabilities and limitations. Consequently, they should be used so that they compliment each other and so that total dependence is not placed on any one means. However, the failure of one or all of the available means does not relieve a commander of his communications responsibilities. In brief, the means used in a given situation are generally those that provide the most reliability, flexibility, security, and speed.

a. The various means of communication available are:

- Radio. Its advantages are that it is mobile, less men and time are required for installation and operation, it can span great distances, and remote operation can be used. Its disadvantages are that it is the least secure means of communications (subject to jamming, interception, and deception) and it is subject to interference from the atmosphere, terrain, and man-made sources.

- Wire. Its advantages are that it is more secure than radio, it reduces the probability of interception, and it's desirable in defensive operations. Its disadvantages are that it requires more men for installation and maintenance, it is not mobile, it loses signal power over long distances, and it is subject to maneuver damage.
- Messenger. Its advantages are that it is reliable and flexible, its assets are available in all units, it is the most secure means available to all units, and it can handle large or bulk messages. Its disadvantages are that it lacks person-to-person conversation, it requires more time, and it is subject to enemy action.
- Visual and sound signals. Their advantages are that they are available to all units and they do not use electromagnetic emissions. Their disadvantages are that poor visibility or combat noise restrict their use, they are easily misunderstood, and they are vulnerable to interception.

b. Frequency modulated (FM) radio will be the principal means of communication in a highly mobile operation. However, its susceptibility to enemy electronic warfare (EW) operations must be considered. Single sideband-radio teletypewriter (SSB-RATT) provides secure, longer-range, printed, and bulk message traffic; but it is also susceptible to EW. Pulse code modulation (PCM)/multichannel communication is highly directional and not as susceptible to enemy EW techniques as are FM and SSB radios. Multichannel, provided by the division signal battalion at the division artillery (div arty) and brigade tactical operations centers (TOCs), should be used whenever possible to reduce reliance on SSB-RATT and FM radio. Field wire is the best means of communications and should be used whenever feasible, especially during defensive operations.

6. RADIO NET TITLES. A radio communications system is composed of a number of internal and external radio nets. All net titles have been standardized. Each title includes three elements:

- Controlling headquarters (div arty, battalion, etc.).
- Designated purpose of the net (command, fire direction, intelligence, etc.).
- Modulation (FM or SSB-AM) and type (voice, digital, or RATT) of net.

7. EXTERNAL RADIO NETS. The nerve center of a DS battalion is the TOC. The nets discussed below are instrumental in giving the TOC the capability to communicate with its higher headquarters. (See Figure 1.)

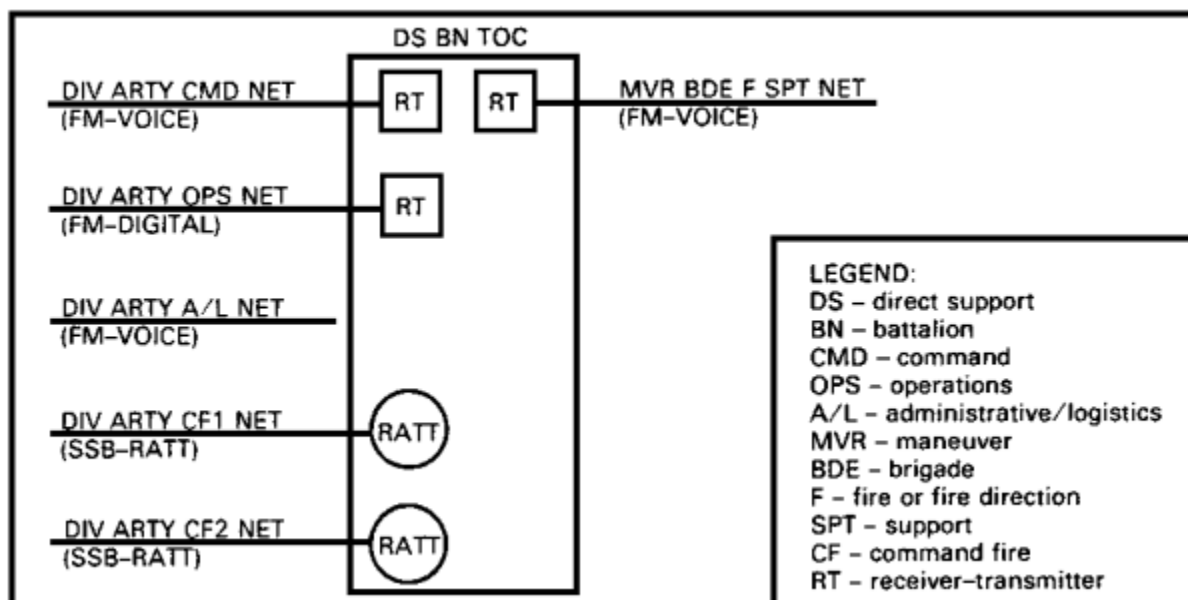


Figure 1. DS battalion external radio nets.

a. Division artillery command net (FM-voice). This net is a multipurpose net used for command and control; collection, exchange, and dissemination of information and intelligence; and coordination of fire support. It links the div arty commander and TOC with the commanders and TOCs of organic and attached FA battalions, reinforcing brigades, and the fire support elements (FSEs) at the maneuver brigades and at the division TOC and tactical command post (CP).

b. Division artillery operations nets (FM-digital). These are the digital tactical fire direction nets of the div arty. Div arty has three of these nets (Ops 1, Ops 2, and Ops 3) to pass fire support coordination, fire planning information, fire missions, tactical orders, and meteorological data. The organic and attached FA battalions use these nets to request additional fire support from div arty and to coordinate counterfire. These nets link the div arty TACFIRE with the FA battalion fire direction centers (FDCs). Normally, each net contains a DS battalion; a GS, GSR, or R battalion; and the FSE, located at the division TOC or tactical CP. Traffic density on these nets is very high because they are also used for coordination of extensive fire support plans and for the collection, exchange, and dissemination of information and intelligence.

c. Division artillery administrative/logistics net (FM-voice). This net is used for administrative and logistical traffic within the div arty. Any battalion-level station may enter this net, as required, to pass administrative or logistical traffic.

d. Division artillery command/fire 1 net (SSB-RATT). Div arty uses this net mainly to communicate with its DS field artillery battalions. Div arty uses this net to transmit tactical and administrative orders, fire missions, and meteorological data. Battalions use the net to request additional fires from div arty. Traffic density on this net is very heavy because the net is used for coordination of extensive FA support planning between the div arty and the DS battalions. It is also used for the collection, exchange, and dissemination of

information and intelligence. The organic GS battalion is a station in the net and it monitors traffic. Units may use the CF1 net as an additional means to send TACFIRE data instead of using the teletype.

e. Division artillery command/fire 2 net (SSB-RATT). Div arty uses this net mainly to communicate with its organic GS battalion, any R or attached GS battalions, and any R artillery brigades. The FSEs located at the division TOC and tactical CP are principal stations in this net. Using this net, the division main FSE coordinates all nuclear fires in the division area of influence in a timely and effective manner. This net is also used for transmission of command and administrative matters, processing information and intelligence, and dissemination of met data. DS battalions will monitor this net.

f. Maneuver brigade fire support net (FM-voice). This net is for planning and coordinating fire support within the brigade. Stations that will operate in this net are the FA battalion TOC, brigade FSE, brigade fire support officer (FS), and battalion FSE. The brigade FSE is the net control station (NCS) of this net.

g. Mutual support unit. One of the nine inherent responsibilities of the field artillery that was introduced with TACFIRE is the responsibility to establish mutual support. Mutual support is discussed further in Appendix A.

8. INTERNAL RADIO NETS. The following radio nets give the DS battalion the capability to command and control its assets, disseminate intelligence, and coordinate fire support. (See Figure 2.)

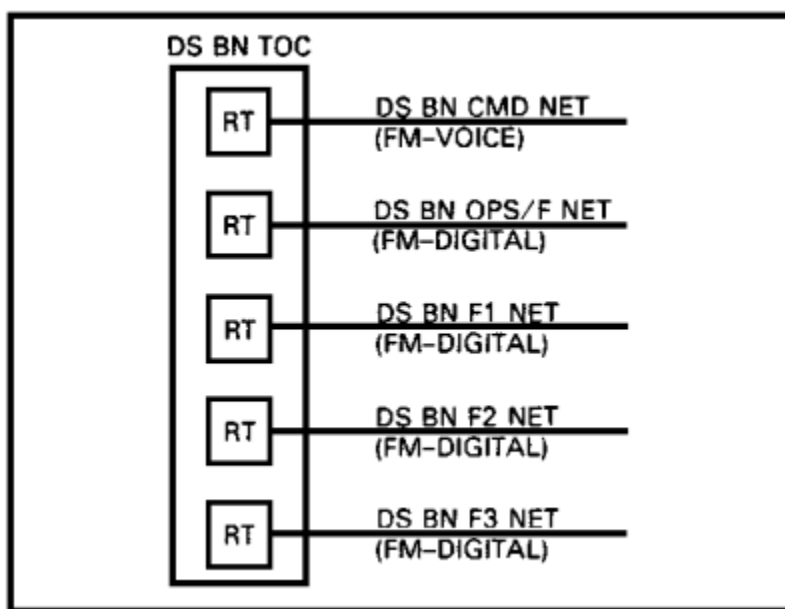


Figure 2. DS battalion internal radio nets.

a. DS battalion command net (FM-voice). This net is the primary net of the DS battalion. All battalion stations initially operate in this net unless otherwise directed by the NCS. This net is used for internal command

and control of the battalion; administrative and logistics matters; and collection, exchange, and dissemination of information and intelligence. Assigned or attached target acquisition assets will also operate in this net.

b. Battalion fire direction nets (FM-digital). These are the digital, tactical, and technical fire direction nets used in all DS battalions. DS battalions have three fire direction nets (F1, F2, and F3). The battalion FDC is the NCS for the fire nets. Each firing battery is assigned to one of these nets for fire control to support the maneuver battalion they are supporting. Battalion and battery FDCs, battalion fire support sections (FSSs), fire support teams (FISTs), combat observation and lasing teams (COLTs), forward observers (FOs), and other assigned or attached target acquisition assets use the fire direction net to request, plan, and coordinate FA support for the maneuver element. Information and intelligence gathered by radars, FISTs, COLTs, and FSSs can be processed over these nets. The fire nets are critical nets which must be uncluttered, responsive, and protected from early exposure to enemy EW activities.

c. Battalion operations/fire direction net (FM-digital). This net is used to pass digital fire planning traffic. This net links the battalion TACFIRE computer with the variable format message entry devices (VMED) at the brigade and battalion FSEs. If wire is not installed between the operations and intelligence (O&I) section and the TACFIRE computer, for whatever reason, the O&I section operates its VMED in this net for coordination of fire support.

9. FIRE SUPPORT RADIO NETS. The following nets give the various fire support sections the capability to coordinate fires to support the maneuver units. At each echelon, the FSO normally will be collocated with the respective maneuver commander.

a. Maneuver brigade FSS (Figure 3).

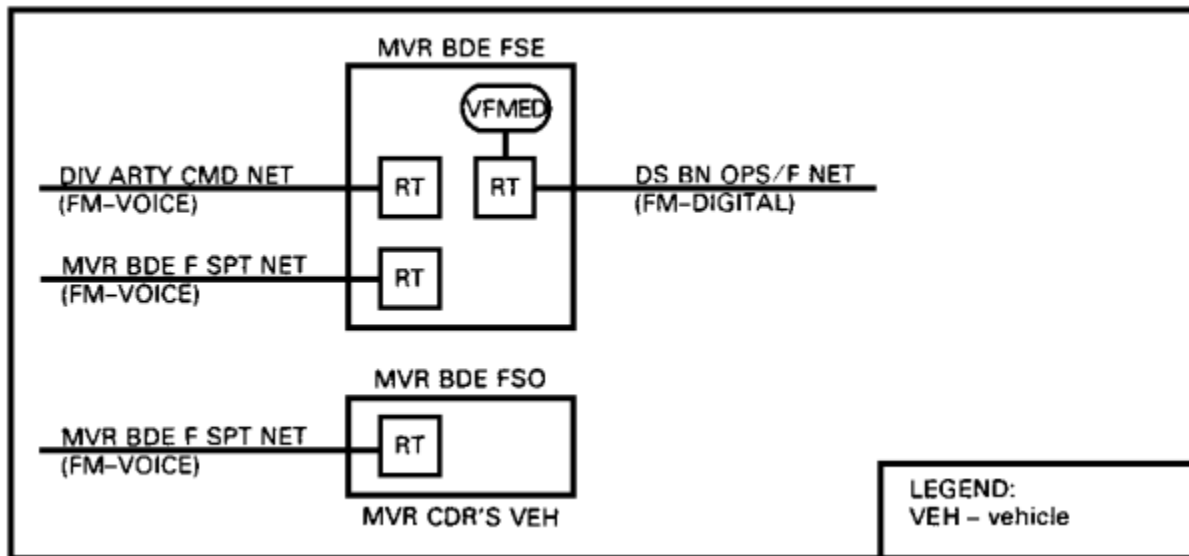


Figure 3. Brigade FSS radio nets.

(1) Division artillery command net (FM-voice). This net links the brigade FSE with the FSEs at the division TOC and tactical CP. This net is used by the div arty commander and staff to pass information used for command and control, dissemination of intelligence, and the coordination of fire support.

(2) Maneuver brigade fire support net (FM-voice). This net is used by the brigade FSS to plan and coordinate fire support within the brigade with the battalion FSSs and the DS battalion.

(3) Direct support battalion operations/fire net (FM-digital). This net is used for command and control and for the collection, exchange, and dissemination of intelligence. This net provides a link between the battalion TACFIRE computer and the VFMEs at the brigade and battalion FSEs to pass digital fire planning and coordination traffic. The FSEs can also access the div arty computer over this net.

b. Battalion FSS (Figure 4).

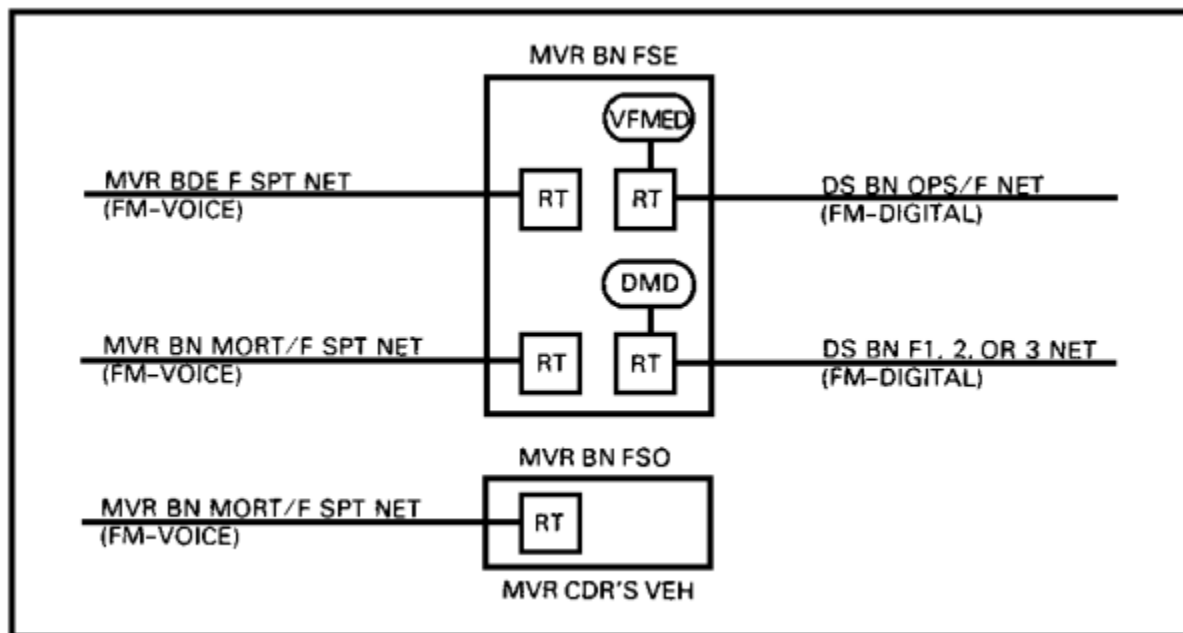


Figure 4. Battalion FSS radio nets.

(1) Maneuver brigade fire support net (FM-voice). This net is used by the brigade FSS to plan and coordinate fire support within the brigade with the battalion FSSs and the DS battalion.

(2) Maneuver battalion mortar/fire support net (FM-voice). The primary purpose of this net is battalion mortar fire direction. In addition to mortar fire direction, this net also provides for voice coordination between fire support entities within the maneuver battalion. In this respect, this net accommodates maneuver-battalion-level fire support coordination traffic. In units without a company mortar fire direction net requirement, this net also provides for voice fire support coordination at company level. Although this net provides for both mortar fire direction and battalion-level fire support coordination, these two functions are essentially split by time phase--fire support coordination being predominant during the planning phases of an operation and fire direction being predominant during the execution phase. The NCS of this net is the battalion FSE.

(3) Direct support battalion operations/fire net (FM-digital). This net is used for command and control; tactical fire direction; collection, exchange, and dissemination of intelligence; and digital fire planning between the DS battalion TACFIRE and the FSEs at the maneuver brigade and battalions.

(4) Assigned direct support battalion fire direction net (FM-digital). The FSS at the maneuver battalion will operate in the DS battalion F1, F2, or F3 net with the battalion and battery FDCs, FISTs, and COLT. This net is used for digital fire direction traffic. The battalion FSE operates its digital message

device (DMD) on this net. The fire nets must remain uncluttered, responsive, and protected from enemy EW activities.

c. FISTs and COLTs (Figure 5).

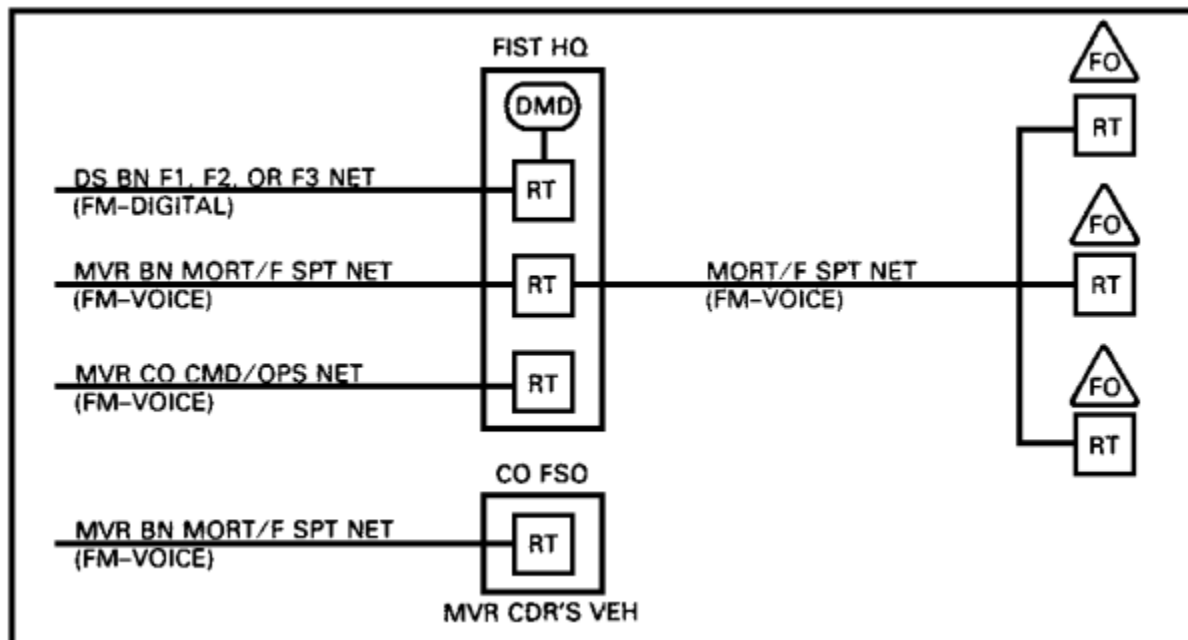


Figure 5. FIST and COLT radio nets.

(1) Assigned direct support battalion fire direction net (FM-digital). The FSS at the maneuver battalion will operate in the DS battalion F1, F2, or F3 net with the battalion and battery FDCs, FISTs, and COLTs. This net is used for digital fire direction traffic. The FISTs and COLTs operate on this net with DMDs. The fire nets must remain uncluttered, responsive, and protected from enemy EW activities.

(2) Maneuver battalion mortar/fire support net (FM-voice). The primary purpose of this net is battalion mortar fire direction. In addition to mortar fire direction, this net also provides for voice coordination between fire support entities within the maneuver battalion. In this respect, this net accommodates maneuver-battalion-level fire support coordination traffic. In units without a company mortar fire direction net requirement, this net also provides for voice fire support coordination at company level. Although this net provides for both mortar fire direction and battalion-level fire support coordination, these two functions are essentially split by time phase--fire support coordination being predominant during the execution phase. The NCS of this net is the battalion FSE.

(3) Maneuver company command/operations net (FM-voice). This net provides a means for keeping abreast of the tactical situation and providing fire support to the maneuver element. Platoon leaders may request

fire initially on this net, although it must not be tied up with fire support adjustment.

d. **FOs.** The FOs request fires on the maneuver battalion mortar/fire support net directly to the maneuver battalion mortar platoon FDC. This net is monitored by the company FSO and the FIST headquarters. If the battalion mortars are unable to respond to an FO's fire request or if the FSO decides the mission is more appropriate for the field artillery, the FSO will direct his FIST headquarters to enter a digital request for FA fires. The FIST headquarters informs the FO of the action being taken on his request.

10. **TACFIRE and NONTACFIRE COMMUNICATIONS.** A TACFIRE-equipped DS battalion may be required to operate with a nonTACFIRE FA unit which is reinforcing or general support reinforcing. The equipment, capabilities, and procedures used by each unit are not identical. These differences must be considered. General situations and options for TACFIRE and nonTACFIRE communications are discussed in Appendix B.

11. **FIRING BATTERY RADIO NETS.** The following nets give the firing battery the capability to transmit and receive information needed to meet its mission. (See Figure 6.)

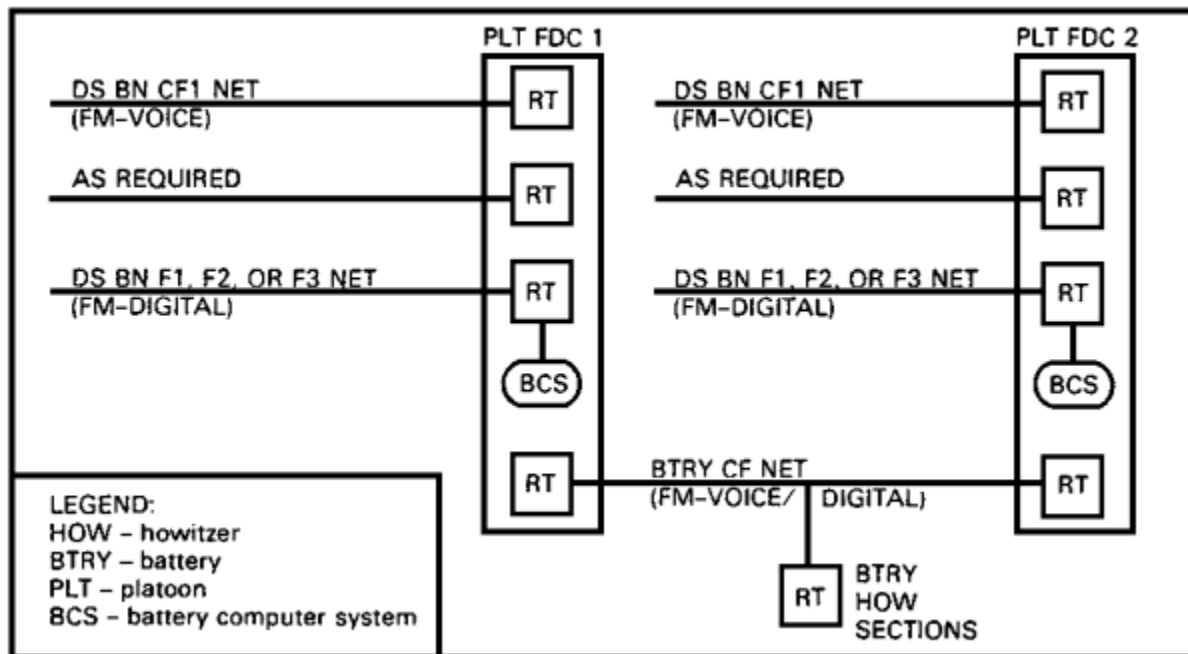


Figure 6. DS battalion firing battery radio nets.

a. External. The firing battery operates in two external radio nets.

(1) DS battalion command fire 1 net (FM-voice). This net is a secure FM-voice net used for command and control, administration and logistics, and intelligence information. The battery commander, first sergeant, platoon leaders, platoon sergeants, platoon FDCs, and ammunition sections operate in this net. Only time-sensitive traffic should be transmitted on this radio net. Traffic that is not time-sensitive should be passed by alternate means (wire or messenger). Battery personnel can be used to disseminate information while performing normal operations.

(2) Assigned DS battalion fire direction net (FM-digital). The battalion F1, F2, and F3 nets are tactical and technical fire direction nets that are assigned one to each firing battery. The assigned net normally is used to pass digital traffic. However, it may be converted to a voice net. Each platoon FDC operates in this net and communicates digitally with the battalion FDC by using the battery computer system (BCS). The platoon FDC also can use the net to communicate with the maneuver battalion FSS, FIST, COLT, and any assigned or attached target acquisition assets.

b. Internal. The firing battery has one internal radio net. The battery command/fire direction net (FM-voice/digital) is the principal means for internal communications during convoy movements, hip shoots, initial laying of the battery, technical fire direction, and platoon and battery operations when wire communications have not been established or are disrupted. The battery commander and each platoon leader, FDC, howitzer, and field artillery ammunition support vehicle (FAASV) operate in this net. This radio net supplements, but does not replace, wire communications at platoon or battery level. Wire will continue to be the principal and preferred means of communications in the platoons and battery because it is uniformly available in all cannon batteries and is less susceptible to the effects of electronic warfare. Radio communications will be used only until wire is established.

12. WIRE SYSTEM. The extent of the unit wire system depends on the length of time the unit remains in a particular position and the tactical situation. A unit must continually improve its wire communications system by installing duplicate lines over alternate routes, constructing overhead or buried wire crossings, cabling multiple lines, and rerouting lines around exposed points in the system. Each of the unit radio nets should be paralleled by a wire line and used to decrease its susceptibility to enemy electronic warfare.

a. DS battalion wire system (Figure 7). Each DS FA battalion has four wire teams assigned to its headquarters battery. Their responsibilities are to install wire lines to each of the firing batteries and the supported maneuver brigade. The priorities listed below are a suggested sequence for installing wire lines. This sequence can be modified by the commander or the tactical situation. Each priority has several circuits, but they can be installed at the same time.

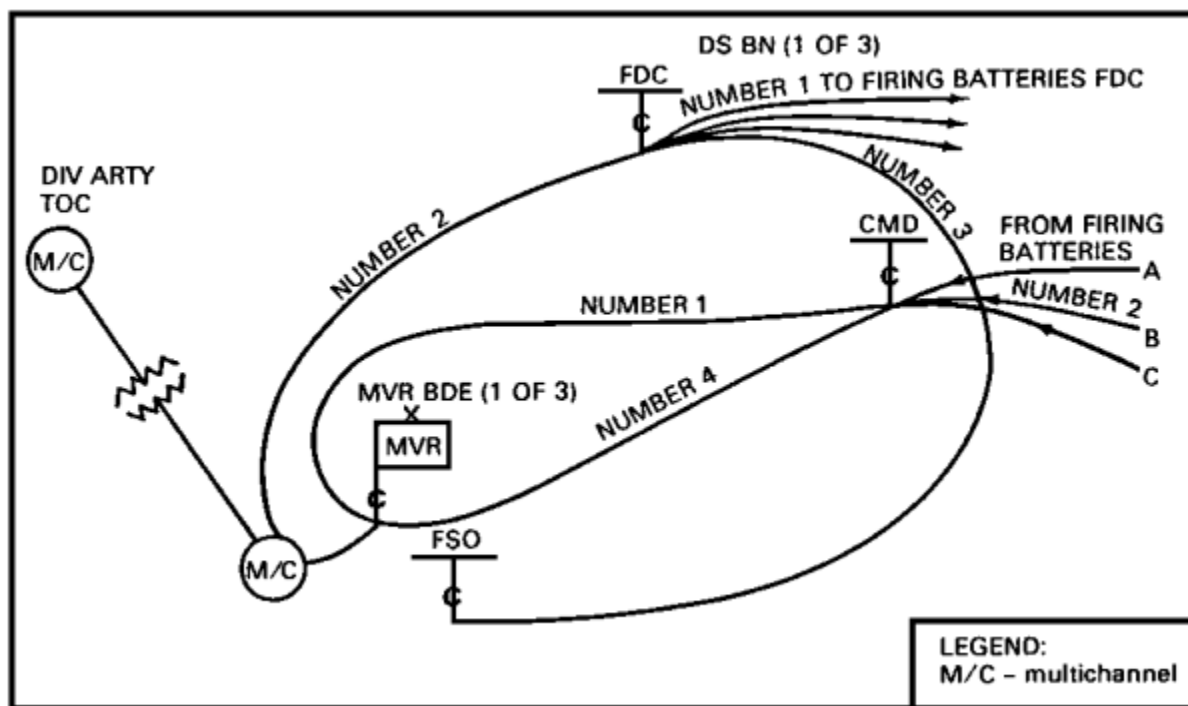


Figure 7. DS battalion wire system.

(1) First priority. The first wire line will be installed by one wire team from the DS battalion command switchboard to the supported maneuver brigade command switchboard. This satisfies the supporting-to-supported responsibility of the DS battalion. This line may also satisfy the senior-to-subordinate responsibility of div arty to its organic battalions, using the existing multichannel link located at the maneuver brigade. This will also give the battalion FDC the capability to talk to the brigade FSS. At the same time, the remaining three wire teams will install wire lines from the DS battalion TACFIRE to each firing battery wire head, terminal strip TM-184. This line is connected internally by the battery to each platoon FDC battery computer unit (BCU).

(2) Second priority. Each wire team must return from the brigade and batteries. On the return trip, the team at the supported brigade will install a circuit from the multichannel terminal located at the supported brigade to the battalion FDC to complete a sole-user circuit from the div arty TOC to the DS battalion FDC. The other three teams, on their return from the batteries, will install lines from the battery wire head to the battalion command switchboard. These lines are connected internally by the batteries from the battery wire head to their battery switchboard. These return trips to the battalion should not follow the initial routes.

(3) Third priority. A wire team from the DS battalion will install a wire line to the brigade FSS located at the maneuver brigade from the DS battalion FDC. This establishes a sole-user circuit from the fire direction officer (FDO) at the DS battalion FDC to the brigade FSS.

(4) Fourth priority. Install a backup circuit between the battalion command switchboard and the supported maneuver brigade switchboard, and complete the installation and improvement of the battalion internal wire system.

b. Battery wire system. The battery uses switchboards, telephones, and BCS to terminate internal and external wire communications. Wire offers a higher degree of EW protection and is used as the principal communications means when the battery is operating from firing positions. However, in a highly mobile environment, wire communications are difficult to use because of the time required to install, maintain, and recover wire. Wire communications will be used when the tactical situation and mission allow. The battery wire system can be installed in three phases as described below.

(1) Advance party. The advance party wire system (Figure 8) is quickly installed and provides a rapid means to lay the platoon and battery.

(a) When the advance party arrives at a new location, the communications section representative places the platoon wire head (terminal strip TM-184) near the platoon center behind the gun line. This will allow personnel to troubleshoot the wire system from the platoon wire head without walking in front of the gun line.

(b) The gun guides install the wire line from the platoon wire head to the gun positions by using a DR-8 (1/4-mile reel). The running end of the wire line is connected to the proper pair of binding posts on the platoon wire head and is then tied off to a nearby stake and tagged. The wire lines are routed to a stake in front of the gun line to ensure that they are not damaged by vehicle traffic in the area. The gun guides route the wire from this stake to their respective gun positions. The wire line is connected to a telephone set TA-312/PT at the gun position.

(c) The FDC representative installs a wire line running from the platoon wire head to the FDC position by using a DR-8. The wire line is routed to the FDC position and connected to a TA-312/PT.

(d) A wire line is installed to the aiming circle from the nearest gun position or the platoon wire head, whichever is easier. Once that wire line is installed and a TA-312/PT is connected, telephone communications is possible to initially lay the platoon.

(e) The wire lines are identified by tagging them individually at each end (or terminal point) and at each stake to facilitate troubleshooting the wire systems. Wire tags should be prepared and labeled in accordance with the unit communications-electronics operation instructions (CEOI) and SOP.

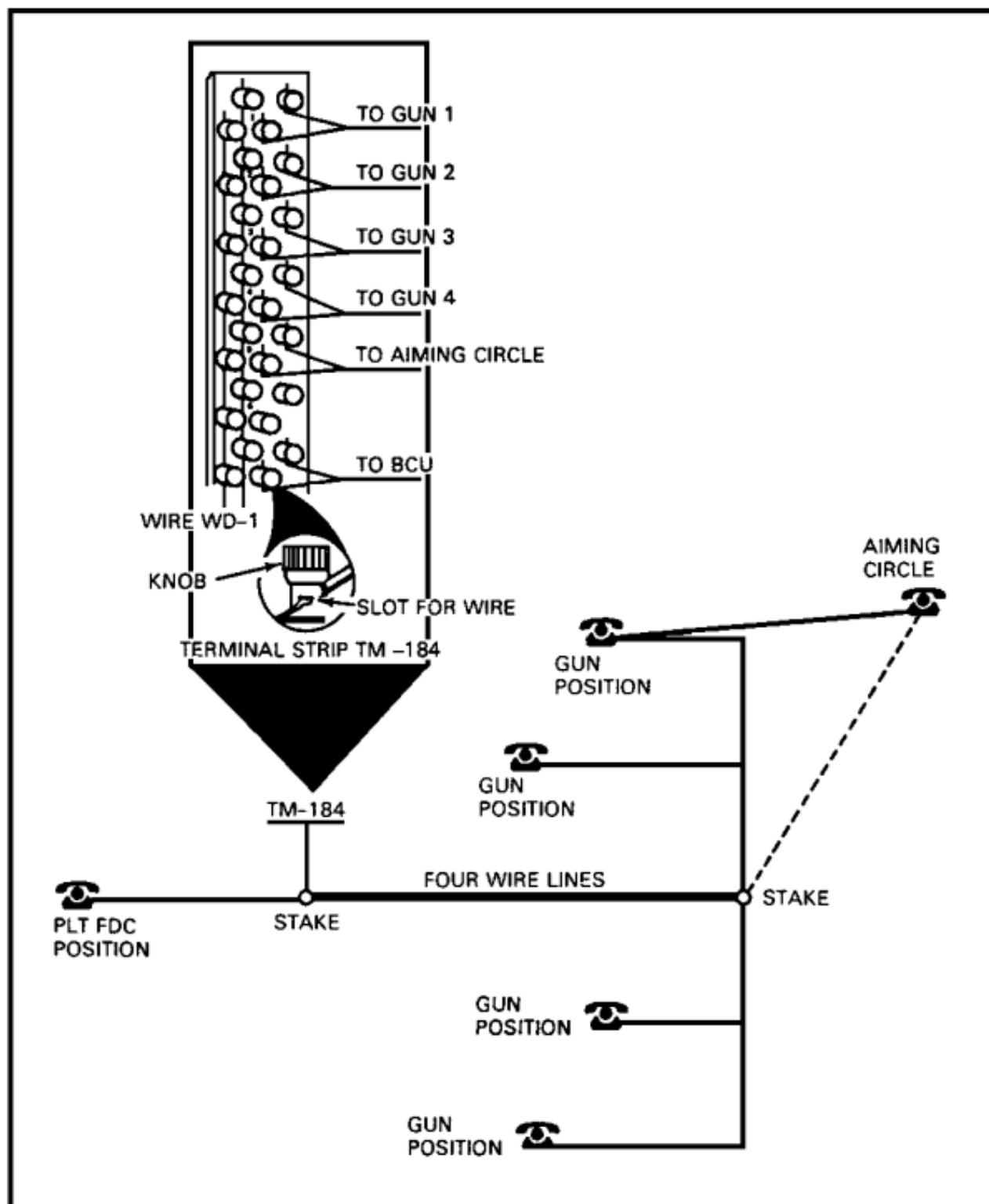


Figure 8. Advance party wire system.

(2) Main body occupation. The main body occupation wire system (Figure 9) provides digital communications for technical fire direction.

(a) When the howitzers arrive at the new position, the TA-312/PT at the gun position is used to communicate with the aiming circle operator to lay and safe the gun. When the platoon is laid and safe, the FDC must instruct all operators to disconnect the wire lines from the TA-312/PTs and connect them to the gun display units (GDUs) at the howitzers and the BCU at the FDC.

(b) After the TA-312/PTs are disconnected, the wire line at the gun is taken around the front of the howitzer to the assistant gunner's side and tied off to a stake next to the gun. The wire line is then routed up the side of the gun and connected to the GDU (BCU binding posts of the case assembly). The wire line is tied off to the handle of the case assembly. The wire line should have enough slack (about 12 feet) between the stake and the case assembly to allow the gun turret to traverse left and right.

(c) The wire line at the FDC will be staked at the curbside rear of the FDC vehicle and routed into the vehicle. The wire line is connected inside the FDC to the BCU (GDU channel wire binding posts).

(d) All traffic is now digital. However, voice communications can still be passed through this wire system by using the headset-microphone H-182/PT at the section chief assembly and the BCU. Net discipline must be enforced to prevent voice traffic from interfering with the digital signal.

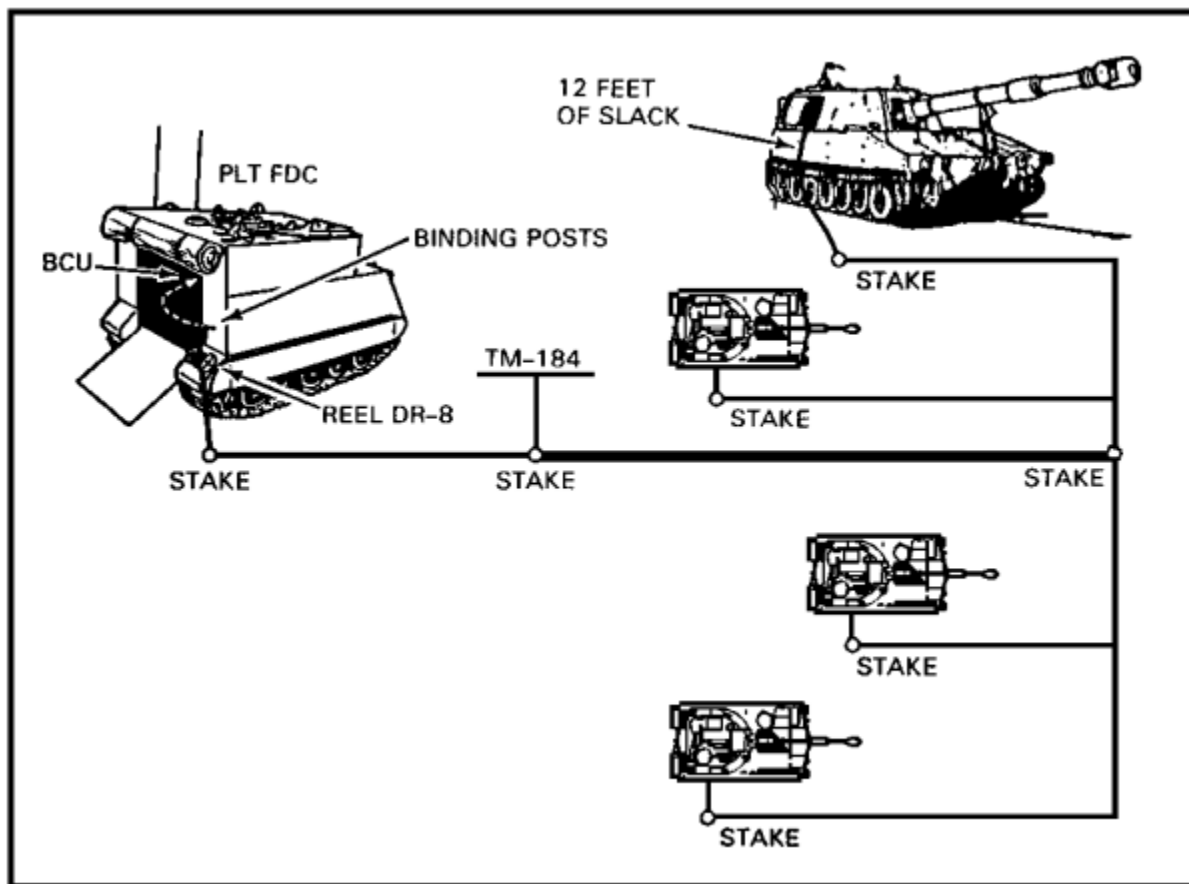


Figure 9. Main body occupation wire system.

(3) Complete system. The battery wire system (Figure 10) is considered complete when all internal and external wire lines and switchboard wire lines are connected to the battery wire head.

(a) A battery wire head (a second terminal strip TM-184) is positioned in the vicinity of the controlling platoon FDC on the battery perimeter.

(b) The communications section installs wire lines from the BCUs of both FDCs to the digital terminals on the battery wire head. These wire lines provide digital communications between the two platoon FDCs and provide a digital connection from the battalion FDC.

(c) A wire line is installed from the battery wire head voice terminals to the switchboard SB-22/PT at the battery headquarters location. Wire lines are then installed from the battery headquarters switchboard to the two platoon FDC SB-22/PTs. This provides voice connection between the battery headquarters, the platoon FDCs, and the switchboard located at battalion headquarters.

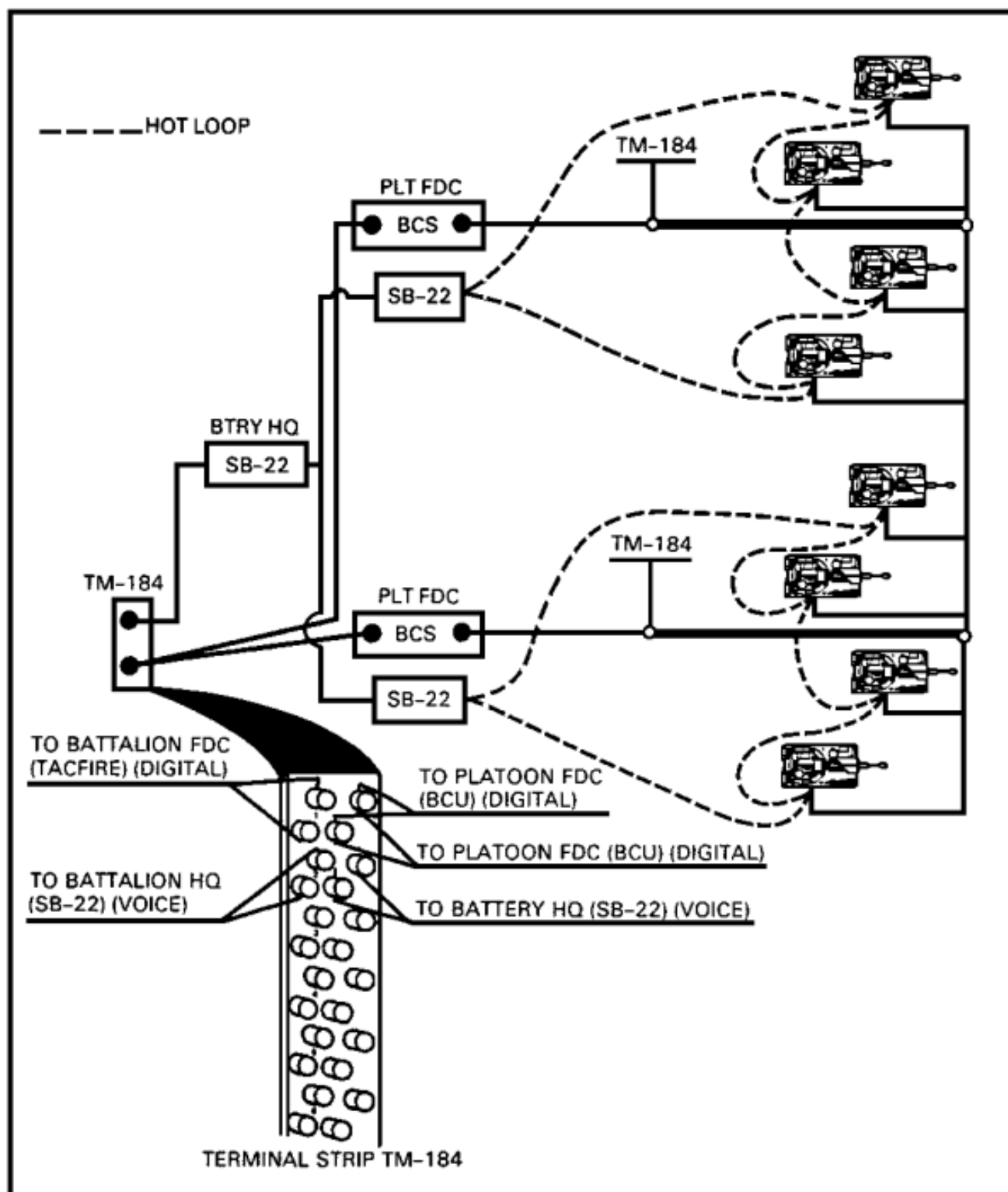


Figure 10. Complete battery wire system.

(4) External wire lines. While the battery wire system is being installed, a battalion wire team installs external wire lines to the battery.

(a) The first wire line is installed from the battalion FDC to the battery wire head. This line is attached at the digital terminals of the battery wire head. The connection completes the external wire line for digital traffic between the platoon FDCs and the battalion FDC.

(b) The battalion wire team installs a second wire line from the voice terminals of the battery wire head to the battalion command switchboard. This wire line completes the external voice connection between the battery switchboard and the battalion switchboard.

(5) The wire system now provides communications links that parallel the external and internal radio nets.

(6) When the battery is not equipped to operate the battery CF net, the unit must install a hot loop wire system in each platoon to provide a voice backup system. The hot loop is installed by using an RL-159 (1-mile reel). The wire line begins at the platoon FDC, is routed to each gun, and returns to the FDC. A TA-312/PT is connected to the hot loop wire system at each position.

c. Fire support sections wire system (Figure 11).

(1) It is a requirement for the maneuver units to establish communications with their subordinates (senior to subordinate). The FSSs at each echelon can satisfy the senior-to-subordinate responsibility through existing maneuver links by installing a wire line into the maneuver switchboards. This will enable the FSOs at each echelon the ability to establish communications with each other. It will also satisfy the supporting-to-supported requirement by providing the FSOs access into the maneuver brigade wire system.

(2) If no maneuver wire systems are available to help the FSEs at these various echelons meet the requirement of senior to subordinate, those elements will have to make provisions to establish wire communications to their subordinate elements.

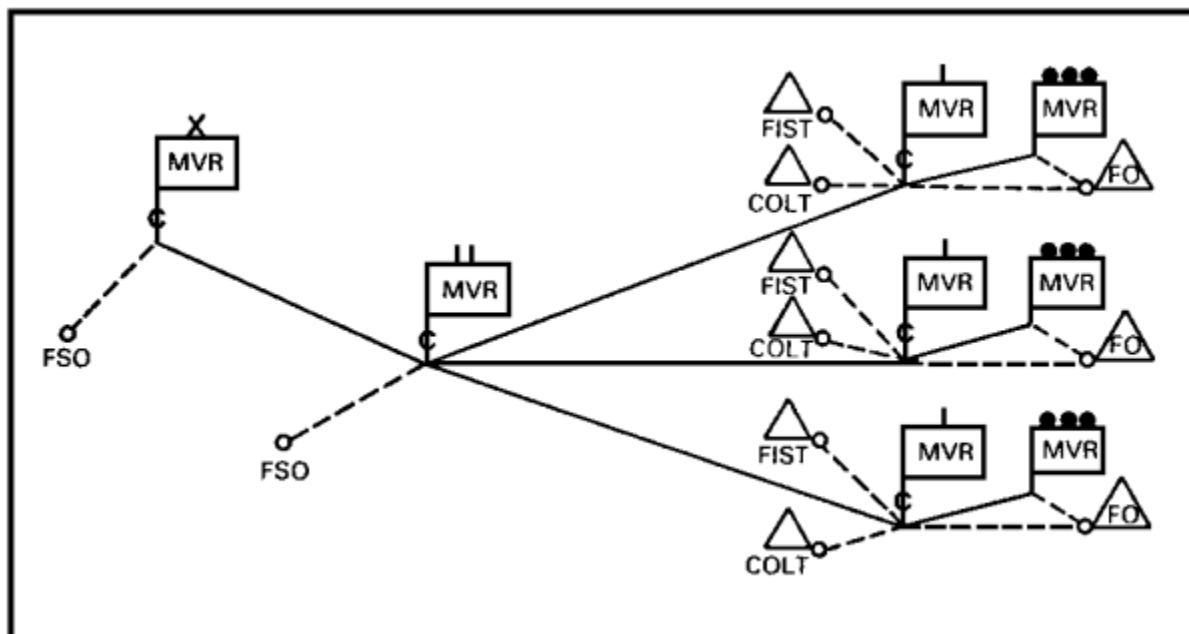


Figure 11. FSS wire system.

PRACTICE EXERCISES:

Complete the following exercises by circling T for true or F for false, circling the letter preceding the correct answer, or filling in the blanks, as appropriate. Be sure to complete the practice exercises as they appear. They are "building blocks" and will help you complete the rest of the subcourse successfully. The answers follow the last exercise and are separated by rows of slashes (/////). If any of your answers are incorrect, restudy the appropriate part of the subcourse before you continue.

1. The communications systems of an artillery unit serve it for _____, _____, and _____.
2. An artillery unit with a mission of direct support has the responsibility to establish communications with the _____.
3. A DS battalion has _____ internal radio nets.
4. A DS battalion firing battery operates externally to its battalion over _____ radio nets.
5. The firing battery wire system can be installed in _____ phases.

1. fire support coordination, tactical and administrative orders, dissemination of information and intelligence.
2. supported maneuver unit.
3. five
4. two
5. three

13. SUMMARY. It is obvious how important a reliable communications system is to a DS battalion to effectively support maneuver forces with timely and accurate fire. For this reason, command emphasis must be placed on communications training and maintenance.

- a. To satisfy a DS battalion communications requirements (from the forward observers all the way up the fire support chain) for fire support coordination, tactical and administrative orders, and intelligence traffic, we have established radio nets at all echelons. We must use these nets efficiently and use procedures to minimize their susceptibility to enemy electronic warfare.

b. The secondary means of external communications (wire) closely parallels our radio system. In a static situation, we must strive to install every possible wire line, both internal and external. With all lines established, information, at all levels in the field artillery, can be passed without exposing our frequencies and without allowing the enemy to discover our positions and disrupt our communications. In a dynamic situation, we must have our wire personnel trained and our priorities set so the most important links are established first.

c. Command emphasis that demands high training standards and communications discipline will allow us to integrate our firepower into the elements of the combined arms team and not only survive on the modern battlefield but dominate it.

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Lesson 2

IDENTIFY COMMUNICATIONS SYSTEMS OF A GENERAL SUPPORT BATTALION (DIGITAL)

OBJECTIVE

After completing this lesson, you will be able to identify the internal and external communications systems (radio and wire) of a GS battalion.

REFERENCES

This subcourse is based on FM 6-1, FM 6-20-1J, FM 6-20-2J, FM 6-50, Close Support Study Group III: Final Report, and other materials approved for US Army field artillery instruction. However, development and progress render the text continually subject to change. Therefore, base your examination answers on material presented in this subcourse rather than on individual or unit experience.

14. INTRODUCTION.

a. Communications is the cornerstone for successful operations in TACFIRE-equipped units. For a GS FA unit to provide responsive fire support on today's battlefield for the force FA headquarters or a reinforced FA unit, it must have efficient and reliable communications systems. These systems must provide the commander with the means to control his unit, exercise tactical and technical fire direction, disseminate information and intelligence, and maintain contact with higher headquarters and with reinforced, reinforcing, or supported units during both conventional and nuclear war.

b. During this lesson, we will discuss communications systems for divisional GS battalions in AIM divisions. The systems presented represent current thought at the US Army Field Artillery School as to the minimum essential communications required by divisional GS battalions. Changes to these systems are to be expected in the field to meet mission requirements.

15. COMMUNICATIONS SYSTEM FUNDAMENTALS. The communications system fundamentals for a GS battalion are the same as the system fundamentals for a DS battalion. The following discussion is a review of those fundamentals.

a. Communications systems. A unit must use its communications systems during its various training phases. When properly planned, a prearranged communications system eliminates the need for publication of numerous and detailed signal orders and instructions and increases the efficiency of the system.

(1) A communications system results from a communications plan designed to fulfill the requirements of a specific mission based on:

- The assigned mission.
- The TOE which provides the communications assets.
- The communications responsibilities.

(2) Standard systems are used for each of the four standard tactical missions that provide rapid and accurate interface between units in a combat environment. Only when a nonstandard mission is assigned to a unit does the possibility arise for changes to the net structures to meet new communication requirements. Such changes should be kept to a minimum to meet the requirements of the situation.

(3) These standard net structures and designations should become part of the SOP of a unit for each mission that may be assigned to the unit as system diagrams. It is imperative that these SOP diagrams be kept current at all times as TOEs or missions change. These system diagrams should reflect those communications nets needed to satisfy both internal and external communications requirements. Separate diagrams should be developed for the wire and radio systems.

b. Communications requirements. The communications system of an artillery unit must satisfy two communications requirements--internal and external. These serve the unit for fire support coordination, tactical and administrative orders, and dissemination of information and intelligence.

(1) Internal communications requirements. Internal communications requirements include the facilities for control and coordination of the activities of the unit.

(2) External communications requirements. External communications requirements include the facilities by which a unit maintains communications with its next higher headquarters, adjacent units (as required), and supported or reinforced units for the purpose of receiving data and other information needed for the unit to meet accomplish its mission.

c. Communications responsibilities. Standard responsibilities are followed when establishing communications between units.

- Commander. The commander is responsible for the adequacy and proper use of the communications assets within his command and for their efficient operation in the system of his next higher headquarters.
- Senior to subordinate. The senior unit is responsible for the establishment of communications with its subordinate units, whether organic or attached.
- DS mission. An artillery unit with the mission of direct support has the responsibility of establishing communications with the supported maneuver unit.
- GS mission. An artillery unit with the mission of general support does not have an inherent responsibility to establish external communications with any other unit.
- GSR mission. An artillery unit with the mission of general support reinforcing must establish communications with the reinforced artillery unit.

- R mission. An artillery unit with the mission of reinforcing must establish communications with the reinforced artillery unit.
- Joint maintenance. Regardless of who is responsible for establishing a communications system, all units and users being served by the system must help restore it once it is disrupted. This will expedite reestablishment of the disrupted system.

d. Means of communication. The reliability of a communications system is greatly increased by the use of all means available.

(1) The various means of communications have different capabilities and limitations. Consequently, they should be used so that they complement each other and so that total dependence is not placed on any one means. However, the failure of one or all of the available means does not relieve a commander of his communications responsibilities. In brief, the means used in a given situation are generally those that provide maximum reliability, flexibility, security, and speed.

(2) The various means of communications available are:

- Radio.
- Wire.
- Messenger.
- Visual and sound signals.

(3) FM radio will be the principal means of communications in a highly mobile operation. However, its susceptibility to enemy EW operations must be considered. SSB-RATT provides security, longer-range, printed, and bulk traffic, but it is also susceptible to EW. PCM-multichannel communications are highly directional and not as susceptible to enemy EW techniques as are FM and SSB radios. Multichannel should be used whenever possible to reduce reliance on SSB-RATT and FM radios. Field wire is the most desired means of communications and should be used whenever feasible, especially in defensive operations.

e. Radio net titles. A radio communications system is composed of a number of internal and external radio nets. All net titles have been standardized. Each title includes three elements:

- Controlling headquarters (division artillery, battalion, etc.).
- Designated purpose of the net (command, fire direction, intelligence, etc.).
- Modulation (FM or SSB-AM) and type (voice, digital, or RATT) of net.

16. GS RADIO SYSTEM. The nets that make up the radio systems of a divisional GS unit vary depending upon the organization of the division. One of the following situations will exist:

- The GS battalion will be comprised of only 203-mm (8-inch) cannon batteries.
- The GS battalion will be a composite 203-mm and multiple launch rocket system (MLRS) battalion with two batteries of 203-mm and one battery of MLRS.
- General support will be provided by one MLRS battery (MLRS battery is organic to the div arty).

17. EXTERNAL RADIO NETS. The nerve center of a GS battalion is the TOC. The nets discussed below are instrumental in giving the cannon or composite battalion TOC the capability to communicate with its higher headquarters and a reinforced unit. (See Figure 12.)

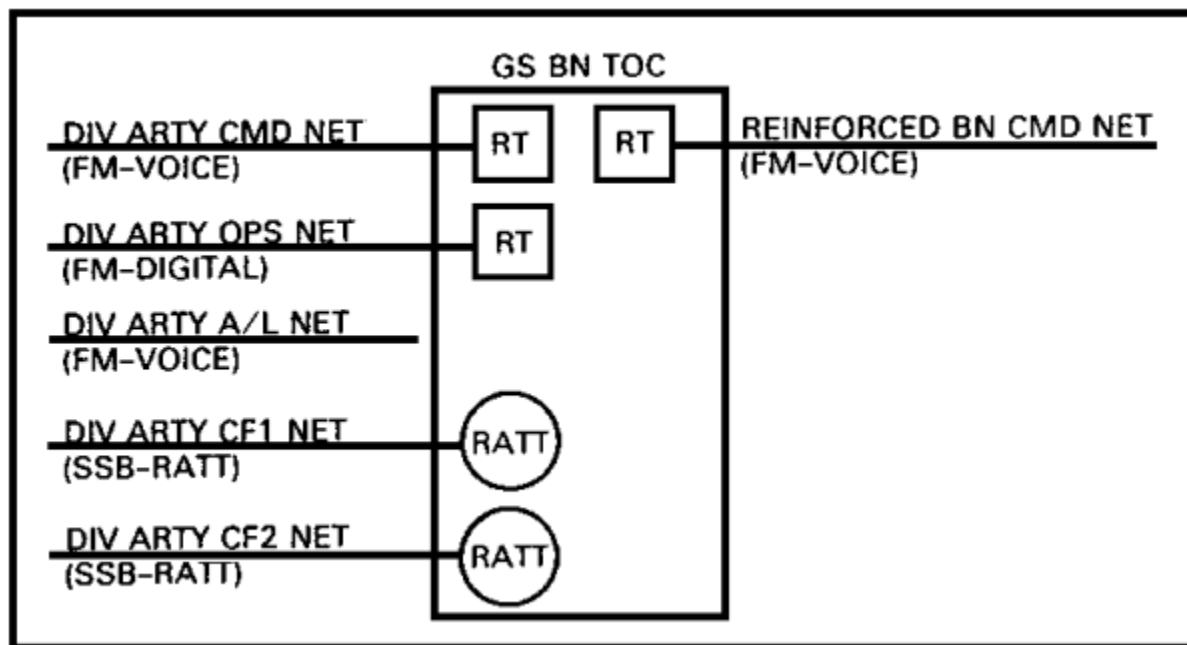


Figure 12. GS battalion external radio nets.

a. Division artillery command net (FM-voice). This net is a multipurpose net used for command and control; collection, exchange, and dissemination of information and intelligence; and coordination of fire support. It links the div arty commander and the TOC with the commanders and TOCs of organic and attached FA battalions, reinforcing brigades, and the FSEs at the division TOC and tactical CP.

b. Division artillery operations nets (FM-digital). These are the digital tactical fire direction nets of the div arty. Div arty has three of these nets (Ops 1, Ops 2, and Ops 3) to pass fire support coordination, fire planning information, fire missions, tactical orders, and meteorological data. The organic and attached FA battalions use these nets to request additional fire support from div arty and to coordinate counterfire. These nets link the div arty TACFIRE with the FA battalion FDCs. GS battalions, organic or attached, normally operate on the same operations net as the DS battalion it is reinforcing or in mutual support of. Otherwise, it will operate in whichever net it is directed to by the div arty. Traffic density on these nets is very high, because they are also

used for coordination of extensive fire support plans and collection, exchange, and dissemination of information and intelligence.

c. Division artillery administrative/logistics net (FM-voice). This net is used for administrative and logistical traffic within the div arty. Any battalion-level station may enter this net, as required, to pass administrative or logistical traffic.

d. Division artillery command/fire direction 1 net (SSB-RATT). Div arty operates this net to communicate mainly with its DS FA battalions. Div arty uses this net to transmit tactical and administrative orders, fire data, and meteorological data. Battalions use the net to request additional fires from div arty. Traffic density on this net is very heavy, because the net is used for coordination of extensive FA support planning between the div arty and the DS battalions. It is also used for the collection, exchange, and dissemination of information and intelligence. The organic GS battalion is a station in the net and monitors traffic. Units may use the CF1 net as an additional means to send TACFIRE data instead of using the teletype.

e. Division artillery command/fire direction 2 net (SSB-RATT). Div arty operates this net to communicate mainly with its organic GS battalion, any reinforcing or attached GS battalions, and any reinforcing artillery brigades. The FSEs located at the division TOC and tactical CP are principal stations in this net. Using this net, the main FSE coordinates all nuclear fires in the division area of influence in a timely and effective manner. This net is also used for transmitting command and administrative matters, for processing information and intelligence, and for disseminating met data. DS battalions will monitor this net.

f. Reinforced battalion command net (FM-voice). When in the mission of GSR or reinforcing, the GS battalion will operate in this net for command and control; for coordination of fire support between the two battalions; and for collection, exchange, and dissemination of information and intelligence. This fulfills the GS battalion responsibility of reinforcing to reinforced.

g. Mutual support unit (MSU). One of the nine inherent responsibilities of the field artillery, which was introduced with TACFIRE, is the responsibility to establish mutual support. Mutual support communications is discussed further in Appendix A.

18. INTERNAL RADIO NETS. The following radio nets give the 203-mm or composite GS battalion the capability to command and control its assets, disseminate intelligence, and coordinate fire support. (See Figure 13.)

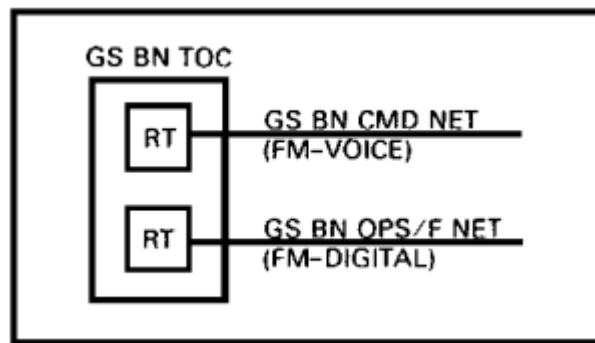


Figure 13. GS battalion internal radio nets.

a. GS battalion command net (FM-voice). This net is the primary net of the GS battalion. All battalion stations initially operate in this net, unless otherwise directed by the NCS. This net is used for internal command and control of the battalion; administrative and logistics matters; and collection, exchange, and dissemination of information and intelligence. Any assigned or attached target acquisition assets may also operate in this net.

b. GS battalion operations/fire direction net (FM-digital). This net is used for tactical and technical fire direction and for the collection, exchange, and dissemination of information and intelligence. It is the sole fire direction net of a GS battalion. If wire is not installed between the O&I section and the TACFIRE computer, the O&I section operates its VFMED in this net to coordinate fire support. The battery FDCs operate in this net with their BCUs to transmit and receive tactical and technical fire direction data.

c. Direct support mission. The GS battalion can be given a mission of direct support. When this occurs, the GS battalion will establish the same five internal radio nets that a DS battalion operates.

19. TACFIRE AND NONTACFIRE COMMUNICATIONS. A TACFIRE-equipped GS battalion may be required to operate with a nonTACFIRE FA unit which is general support reinforcing or reinforcing. The difference between these two units must be considered. General situations and options for TACFIRE and nonTACFIRE communications are discussed in Appendix B.

20. FIRING BATTERY RADIO NETS. The radio systems of the GS firing battery varies depending upon its type (203-mm or MLRS) and organization. The radio nets used in each situation are discussed below.

a. 203-mm cannon battery. The following nets are used by a cannon battery when organic to a 203-mm battalion or a composite 203-mm and MLRS battalion. (See Figure 14.)

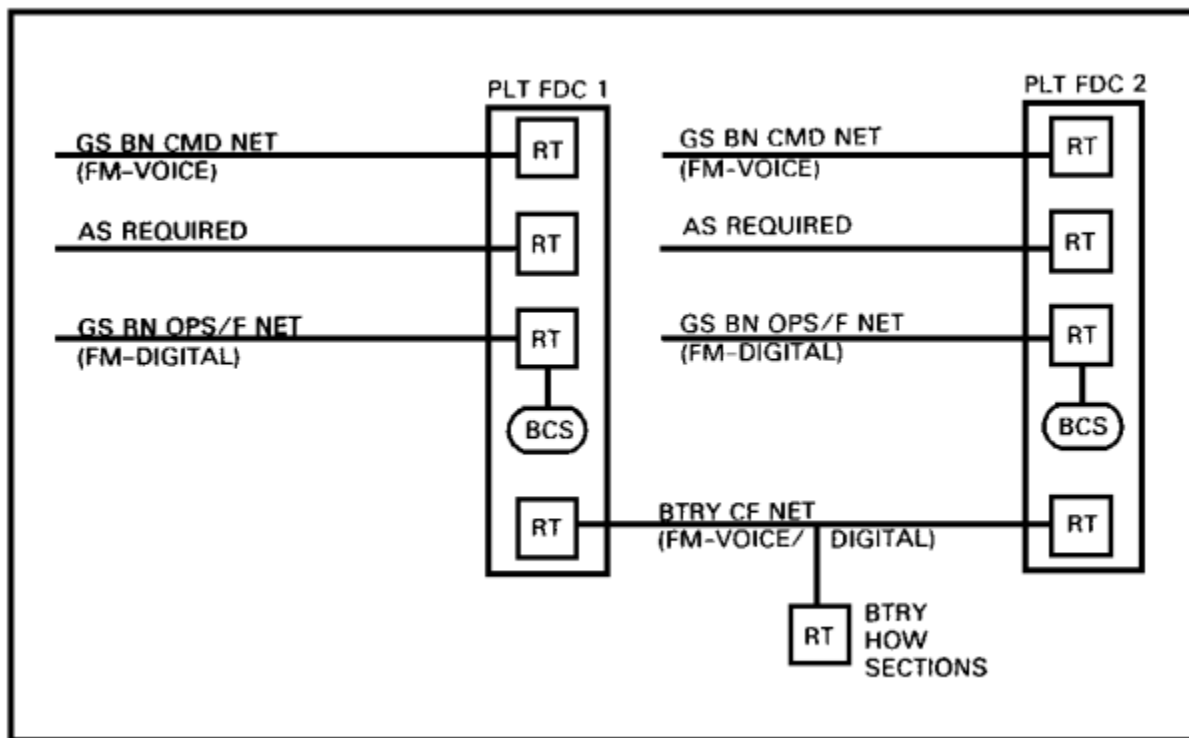


Figure 14. GS battalion cannon firing battery radio nets.

(1) External. The 203-mm cannon battery operates in two external radio nets.

- Battalion command net (FM-voice).
- Battalion operations/fire direction net (FM-digital).

(2) Internal. The firing battery has one internal radio net, the battery command/fire direction net (FM-voice or digital). This net is the principal means for internal communications during convoy movements, hip shoots, and initial laying of the battery when wire communications has not been established or is disrupted. The battery commander and each platoon leader, FDC, howitzer, and FAASV operate in this net. This radio net supplements, but does not replace, wire communications at platoon or battery level. Wire will continue to be the principal and preferred means of communications in the platoons and battery, because it is uniformly available in all cannon batteries and is less susceptible to the effects of electronic warfare. Radio communications will only be used until wire is established.

b. MLRS battery organic to div arty. The following radio nets are used by the MLRS battery when it is organic to the div arty. (See Figure 15.)

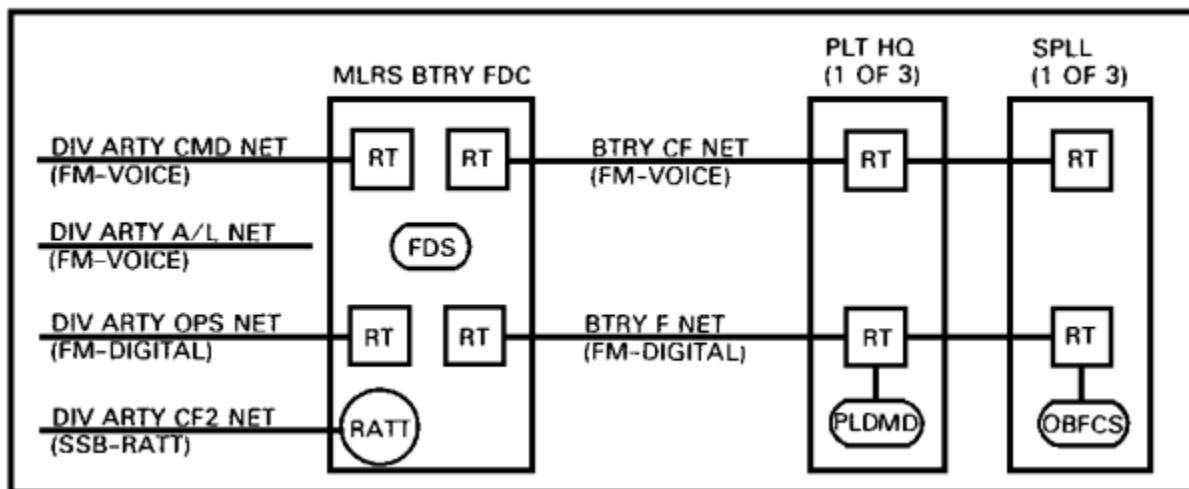


Figure 15. MLRS battery radio nets (organic to div arty).

(1) External. Externally, the MLRS battery will operate in the following radio nets:

- Div arty command net (FM-voice).
- Div Arty operations net 1, 2, or 3 (FM-digital).
- Div arty administrative/logistics net (FM-voice), as required.
- Div Arty command/fire direction 2 net (SSB-RATT).

(2) Internal. Internally, the MLRS battery has two radio nets.

- Battery command/fire direction net (FM-voice). This net is used for command and control; for administrative and logistics matters; for collection, exchange, and dissemination of information and intelligence; and for fire support coordination.
- Battery fire direction net (FM-digital). This is the technical fire direction net for the battery. The battery FDC transmits digital fire data to the platoon headquarters, platoon leader digital message devices (PLDMDs), and the self-propelled launcher-loaders (SPLLs) over this net.

c. MLRS battery organic to a composite battalion. The MLRS battery operates in the following radio nets when it is organic to a composite battalion. (See Figure 16.)

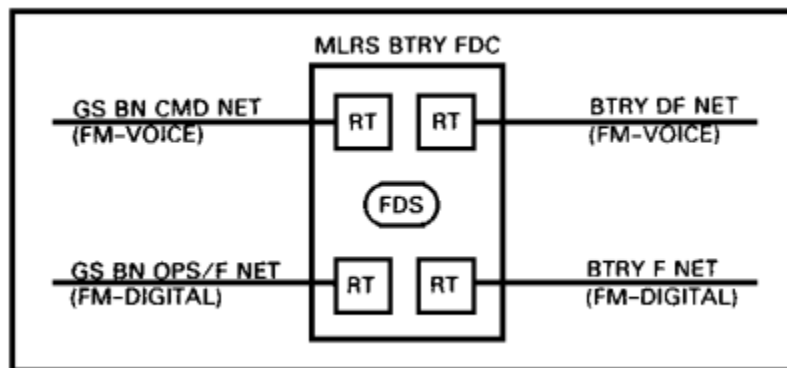


Figure 16. MLRS battery radio nets (organic to a composite battalion).

(1) External. The MLRS battery operates in two external radio nets.

- Battalion command net (FM-voice).
- Battalion operations/fire direction net (FM-digital).

(2) Internal. The MLRS battery operates two internal radio nets.

- Battery command/fire direction net (FM-voice).
- Battery fire direction net (FM-digital).

21. WIRE SYSTEM. The extent of the unit wire system depends on the length of time the unit remains in a certain position and the tactical situation. A unit must continually improve its wire communications system by installing duplicate lines over alternate routes, constructing overhead and buried wire crossings, cabling multiple lines, and rerouting lines around exposed points in the system. Each of the unit radio nets should be paralleled by a wire line and used to decrease its susceptibility to enemy electronic warfare. Wire communications for the MLRS battery will be very limited because of the nature of the MLRS, it being highly mobile and dispersed.

a. Battalion wire system. A GS battalion has four wire teams assigned to its headquarters battery. Their responsibilities are to install wire lines from the battalion to the reinforced battalion and to each organic firing battery. The priorities below are a suggested sequence, but can be changed by the commander or the tactical situation. Each priority will have several wire lines, but they can be installed at the same time.

(1) First priority. Install a wire line from the battalion FDC to the reinforced battalion FDC. Install wire lines from the battalion FDC to each battery wire head. These lines will be connected, internally by the battery, to the platoon FDCs.

(2) Second priority. Install a wire line between the reinforced battalion command switchboard and the battalion command switchboard. This wire line may go to third priority depending upon whether there is a

requirement to install a wire line to a higher headquarters. Install wire lines from the battery wire heads to the battalion command switchboard. These lines will be connected, internally by the battery, to the battery switchboard. These return trips from the reinforced battalion and the batteries should be by a different route from the initial FDC wire line installation to increase communications survivability.

(3) Third priority. Improve the internal battalion wire system.

b. Multichannel. The GS battalion may gain access into the division multichannel system through one of three entry points:

- A forward area signal center (FASC).
- A brigade multichannel terminal.
- A DS battalion which has already established access.

The GS battalion wire teams will have to install the wire to the entry point. The geographic location and tactical situation will dictate the access point.

c. Battery wire system. Battery personnel will establish and maintain the battery wire system with the help of the battery communications section. The battery wire system can be installed in three phases. The battery wire system is installed in the same three phases as the DS battalion battery wire system. Because of the nature of the MLRS, its capabilities, and assets, the battery wire system described will have to be modified to meet their mission requirements and available assets. The discussion below is a summary of the firing battery wire system.

(1) Advance party. The advance party wire system is quickly installed and provides a rapid means to lay the platoon and battery.

(a) When the advance party arrives at a new location, the communications section representative places the platoon wire head (terminal strip TM-184) near the platoon center behind the gun line. This will allow personnel to troubleshoot the wire system from the platoon wire head.

(b) The gun guides install the wire line from the platoon wire head to the gun positions by using a DR-8 (1/4-mile reel). The wire lines are routed to a stake in front of the gun line to ensure that they are not damaged by vehicle traffic in the area. The gun guides route the wire from this stake to their respective gun positions and connect it to a telephone set TA-312/PT.

(c) The FDC representative installs a wire line from the platoon wire head to the FDC by using a DR-8.

(d) A wire line is installed to the aiming circle from the nearest gun position or the platoon wire head, whichever is easier.

(e) The wire lines are identified by tagging them in accordance with the unit CEOI and SOP.

(2) Main body occupation. The main body occupation wire system provides digital communications for technical fire direction.

(a) When the howitzers arrive at the new position, the TA-312/PT at the gun position is used to communicate with the aiming circle operator to lay and safe the gun. When the platoon is laid and safe, the FDC must instruct all operators to disconnect the wire lines from the TA-312/PTs and connect them to the GDUs at the howitzers and the BCU at the FDC.

(b) After the TA-312/PTs are disconnected, the wire line at the gun is taken around the front of the howitzer to the assistant gunner's side and tied off to a stake next to the gun. The wire line is then routed up the side of the gun and connected to the GDU (BCU binding posts of the case assembly). The wire line is tied off to the handle of the case assembly. The wire line should have enough slack (about 12 feet) between the stake and the case assembly to allow the gun turret to traverse left and right.

(c) The wire line at the FDC will be staked at the curbside rear of the FDC vehicle and routed into the vehicle. The wire line is connected inside the FDC to the BCU (GDU channel wire binding posts).

(d) All traffic is now digital. However, voice communications can still be passed through this wire system. Net discipline must be enforced to prevent voice traffic from interfering with the digital signal.

(3) Complete system. The battery wire system is considered complete when all internal and external wire lines and switchboard wire lines are connected to the battery wire head.

(a) A battery wire head (a second terminal strip TM-184) is positioned in the vicinity of the controlling platoon FDC on the battery perimeter.

(b) The communications section installs wire lines from the BCUs of both FDCs to the digital terminals on the battery wire head.

(c) A wire line is installed from the battery wire head voice terminals to the switchboard SB-22/PT at the battery headquarters location. Wire lines are then installed from the battery headquarters switchboard to the two platoon FDC SB-22/PTs.

(4) While the battery wire system is being installed, a battalion wire team installs external wire lines to the battery.

(a) The first wire line is installed from the battalion FDC to the battery wire head.

(b) The battalion wire team installs a second wire line from the voice terminals of the battery wire head to the battalion command switchboard.

(5) The wire system now provides communications links that parallel the external and internal radio nets.

6. An artillery unit with a responsibility to establish communications with a reinforced artillery unit has a mission of _____ or _____.
7. The available means of communications are _____, _____, _____, and _____.
8. A GS battalion has _____ internal radio nets.
9. A GS battalion cannon battery has _____ internal radio nets.
10. A GS battalion has _____ priorities for installing its battalion wire system.

6. general support reinforcing, reinforcing.
7. radio, wire, messenger, visual and sound signals.
8. two
9. one
10. three

22. SUMMARY. It is obvious how important a reliable communications system is to a GS battalion to effectively support the force FA headquarters with timely and accurate fires. For this reason, command emphasis must be placed on communications training and maintenance.

- 34

c. Command emphasis that demands high training standards and communications discipline will allow us to integrate our firepower into the elements of the combined arms team and to not only survive on the modern battlefield but to dominate it.